- **REQUEST:**
  Please provide the geotechnical report that contains the reinforcement information or the correct thickness for the pedestrian concrete paving as shown on D-3, details i, j, k, and l.

  RESPONSE:
  Please refer to page 5 of the geotechnical report for reinforcement and slab thickness.

- **REQUEST:**
  Sheet C-2 indicates items A.2 and A.6, a storage container and four portable restrooms, as part of the construction layout. No specifications are given for these items; please clarify if they are the responsibility of the contractor and provide any necessary specifications if so.

  RESPONSE:
  The storage container and portable restrooms will be coordinated by the City.

- **REQUEST:**
  Sheet C-2, item A.9, removable bollard, is not found on the construction layout.° Please indicate the location and quantity of this item.

  RESPONSE:
  The removeable bollard is no longer being specified. Please omit from your bid.

- **REQUEST:**
  Sheet C-2 calls out turf edge details on sheets SH-3, SH-4, and SH-?, which are not part of the bidding documents. Please provide these sheets or details as necessary.

  RESPONSE:
  Please refer to sheet D-4, detail f for turf edge detailing. Coordinate turf edge installation with fencing contractor for the short section of fencing between the fields and restroom.

555 Maple Sports Fields

RFI Response

Description: Response to contractor questions.

RFI No.

R-1

Issued By: P. Stevens

Date: 09/04/13

- **REQUEST:**
  What are the elevations of the retaining wall on sheet C-PG2? We see the finished surfaces referenced, but which do they denote; curb or retaining wall.

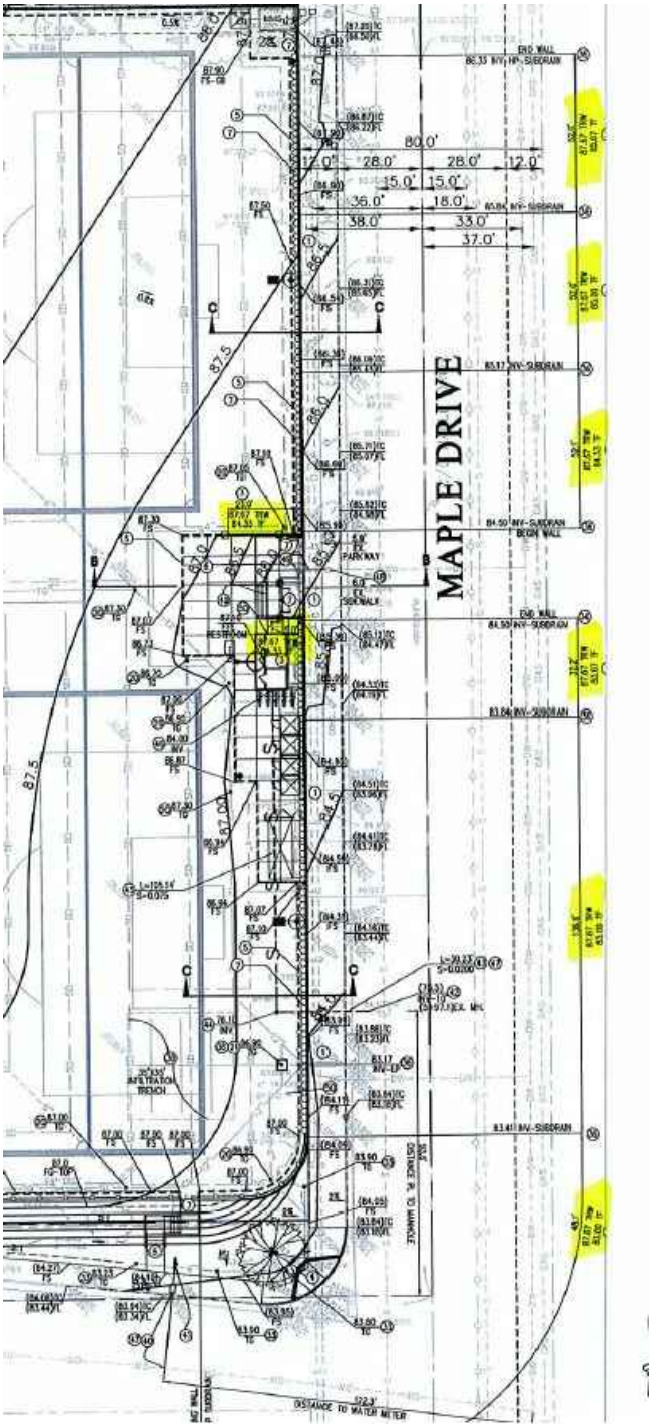
  RESPONSE:
  Top of wall and top of footing grades are shown on the wall construction note/dimensional layout as shown in yellow. All FS grades shown on plan are the hardscape or the top of the mow curb on site.

- **REQUEST:**
  Sheet C-2, item A.9, removable bollard, is not found on the construction layout.° Please indicate the location and quantity of this item.

  RESPONSE:
  The removeable bollard is no longer being specified. Please omit from your bid.

- **REQUEST:**
  Thompson construction supply has a California Gold product, but it is not decomposed granite as the plan denotes but a type of gravel. Gail materials has a California Gold decomposed granite. Is the Thompson spec'd material the correct product?

  RESPONSE:
  The Gail Materials product is acceptible only if it is a stabilized D.G.



555 Maple Sports Fields

RFI Response

Description: Response to contractor questions.

RFI No.

R-2

Issued By: P. Stevens

Date: 09/06/13

- **REQUEST:**
  What is the caisson/footing detail for the Musco lights?

  RESPONSE:
  See Bulletin 2.

- **REQUEST:**
  Who is supplying the portable restrooms shown on sheet C-2 ? Is this a city purchased item?

  RESPONSE:
  The contractor is responsible for ordering and installing the precast restroom. The portable restrooms are coordinated by the city.

- **REQUEST:**
  Confirm that the city is providing the portable restrooms and storage container.

  RESPONSE:
  City will furnish and install the portable restrooms and the storage container.

- **REQUEST:**
  Is the SynLawn parkway turf included with the Astroturf CMAS purchase or does the contractor purchase?

  RESPONSE:
  The contractor is responsible for purchasing and installing the Parkway Turf separately.

- **REQUEST:**
  On sheet P2 there is and Bid Alternative Schedule; I didn't see a place for bid alternates in the bid documents is this to be included?

  RESPONSE:
  Please input bid alternates in the section provided at the bottom of the attached Bid Proposal form.

555 Maple Sports Fields

RFI Response

Description: Response to contractor questions.

RFI No.

R-3

Issued By: P. Stevens

Date: 09/09/13

- **REQUEST:**
  Sheets C-2 and C-PG2 show stairs at the southeast corner of the field. No detail for these stairs and cheekwalls are called out or provided. Please provide details needed for the construction of the concrete stairs and cheekwalls in this location.

  RESPONSE:
  Please use the following detail references for preparing your bid alternate:
  - Concrete Paving: Details I,J,K,L of D-3
  - Concrete steps: Detail D-5 and S-2
  - Retaining wall: Detail S-2
  - Handrail: Detail D-5, section D

- **REQUEST:**
  Sheet C-AD2 has a callout for a note 19; on sheet CD-5 this note is missing. Please provide any information needed for note 19.

  RESPONSE:
  Please refer to the attached/revised sheet CD-5 which clarifies note 19.

- **REQUEST:**
  Sheet C-1 shows two sections of Parkway Turf along the east side of the project site. No cross-sections or details are given for this portion of the project. Please provide any necessary cross-sections and details needed to construct the Parkway Turf portion of the project.

  RESPONSE:
  Please refer to Bulletin L1

- **REQUEST:**
  In the Project Manual there are no specifications given for Synthetic Turf, Site Furnishings, or Electrical work. Please provide any necessary specifications for these items.

  RESPONSE:
  Please refer to the attached information for Electrical work. Install the Synthetic turf in the parkway per manufacturer's recommendations. Install the Bike Rack per manufacturer's recommendations.

- **REQUEST:**
  Sheets C-PG2 and CD-5, note 44, indicate to construct a 4" sewer cleanout per City of Torrance Standards. Please provide the City of Torrance Standard Plan, including any necessary details, to construct a 4" sewer cleanout.

  RESPONSE:
  Please refer to the attached/revised sheet CD-5 which clarifies the sewer clean-out details.

555 Maple Sports Fields

RFI Response

Description: Response to contractor questions.

RFI No.

R-4

Issued By: P. Stevens

Date: 09/09/13

- REQUEST:
  On Sheet C2, the Amenity Schedule shows items A.7 and A.8 as non-bid items. Item A.8, Park Rules Sign, shows a detail on Sheet D-3. Please clarify if these signs are part of the project, and if so please provide a detail for item A.7, Park Signage.

  RESPONSE:
  These items are per the City Parks Dept. No bid requirement.

- REQUEST:
  On Sheet C2 the drawing indicates that there are two sections of 8" turf curb at the intersection of concrete paving and synthetic turf. Detail f on Sheet D-4 indicates a 6"x12" curb at all turf edges. Please clarify the turf curb at the perimeter of the synthetic field, and provide a detail for the 8" sections if necessary.

  RESPONSE:
  Please refer to sheet D-4, detail F for turf edge detailing and widen to 8" as necessary at the area referenced in your question.
  Coordinate turf edge installation with fencing contractor for the short section of fencing between the fields and restroom.

- REQUEST:
  The Earthwork and Site Preparation sections of the Project Manual (02300 and 02200), as well as the Soils Report, all give different levels of overexcavation and recompaction for the concrete paved areas. What specification is correct for this?

  RESPONSE:
  Please refer to the Geotechnical report for overexcavation criteria.

- REQUEST:
  There are a few bid alternates in the project plans, yet the bid documents do not have a section to include these. Are they still part of the project, and if so how would we include them on the bid form?

  RESPONSE:
  Please input bid alternates in the section provided at the bottom of the attached Bid Proposal form.

555 Maple Sports Fields

RFI Response

Description: Response to contractor questions.

RFI No.

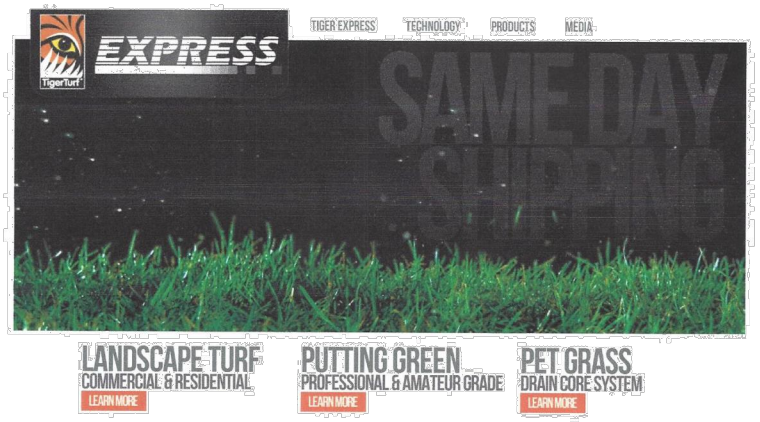
R-5

Issued By: P. Stevens

Date: 09/09/13

- **REQUEST:**
  Please note that the following substitution is acceptable for the Parkway Turf "Synlawn BL05".

SUBSTITUTION:
Tiger Turf - Diamond Light Spring. Install per manufacturer's recommendations.



http://www.tigerexpresslandscape.com/artificial-grass-diamond-light-spring.html 9/4/2013

555 Maple Sports Fields

Landscape Bulletin

Description: Substitution request for synthetic turf in parkway.
See paving schedule item # 4, Sheet C-1 and C-2 of the Landscape package .

Issued By: P. Stevens

Bulletin No.

L1

Date: 09/05/13

- **REQUEST:**
  What is the caisson/footing detail for the Musco lights?

RESPONSE:
See attached footing design for the project provided by Musco's structural engineer.

555 Maple Sports Fields

Landscape Bulletin

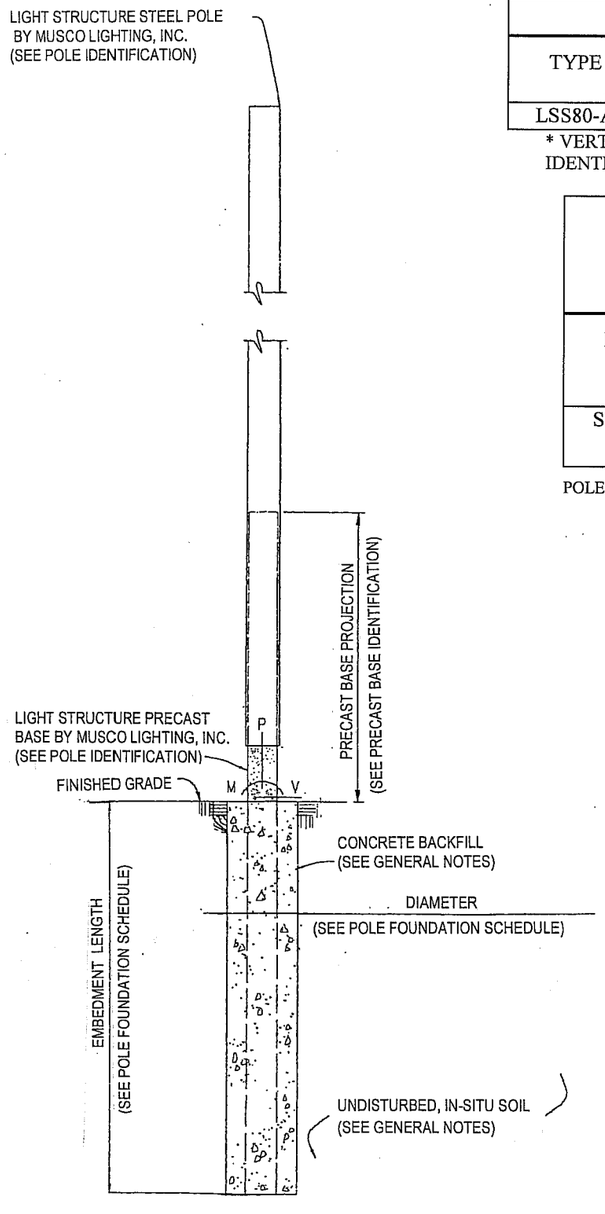
Description: Information regarding foundation design for sports light poles.

Bulletin No.

L2

Issued By: P. Stevens

Date: 09/09/13



LIGHT POLE FOUNDATION DETAIL

POLE FOUNDATION SCHEDULE

	GROUNDLINE FORCES (MAXIMUM)			C.I.P. DEEP FOUNDATION	
TYPE	MOMENT (M) KIP-FT	SHEAR (V) KIPS	VERTICAL (P) KIPS*	DIAMETER INCHES	EMBEDMENT FEET
LSS80-A	85.67	1.744	2.184	30"	14'-0"

* VERTICAL FORCE DOES NOT INCLUDE WEIGHT OF PRECAST BASE. SEE PRECAST BASE IDENTIFICATION BELOW FOR WEIGHT.

POLE IDENTIFICATION

LOCATION MARK	POLE TYPE	PRECAST BASETYPE	FIXTURE CONFIGURATION (FIXTURES PER CROSSARM)	FIXTURE EPA (MAXIMUM)
S1 THROUGH S10	LSS80-A	4B	9(5+4)	19.8

POLES S1, S4, S6, S7, & S9 HAVE A MOUNTING BRACKET FOR ONE LED SECURITY FIXTURE AT 20 FT AGL.

PRECAST BASE IDENTIFICATION

PRECAST BASE TYPE	WEIGHT LBS	OVERALL LENGTH FEET	HEIGHT ABOVE GRADE FEET	EMBEDMENT IN C.I.P. DEEP FOUNDATION FEET	OUTSIDE DIAMETER INCHES
4B	3,750	22'-0"	8'-0"	14'-0"	15.75"

GENERAL NOTES

GENERAL

ALL CONSTRUCTION AND WORKMANSHIP SHALL CONFORM TO THE CALIFORNIA BUILDING CODE, 2010 EDITION.

WIND- ASCE 7-05, 85 MPH (EXPOSURE C)

REFERENCE POLE LOCATION DRAWING FOR ACTUAL POLE PLACEMENT AND SITE LOCATION.

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL CONSTRUCTION PROCEDURES AND SAFETY CONDITIONS AT THE JOB SITE.

SOIL DESIGN PARAMETERS

REFERENCE GEOTECHNICAL REPORT PREPARED BY PETRA GEOTECHNICAL, INC. DATED JUNE 3, 2013; JN 13-248

ALLOWABLE VERTICAL RESISTANCE: 4,000 PSF AT 14'-0" EMBEDMENT.

ALLOWABLE LATERAL RESISTANCE: 150 PSF/FT (A ONE-THIRD INCREASE IS ALLOWED FOR LOAD COMBINATIONS INCLUDING WIND OR SEISMIC).

A REPRESENTATIVE OF PETRA GEOTECHNICAL, INC. SHOULD BE AVAILABLE AT THE TIME OF THE FOUNDATION INSTALLATION TO VERIFY THE SOIL DESIGN PARAMETERS AND TO PROVIDE ASSISTANCE IF ANY PROBLEMS ARISE IN FOUNDATION INSTALLATION.

ENCOUNTERING SOIL FORMATIONS THAT WILL REQUIRE SPECIAL DESIGN CONSIDERATIONS OR EXCAVATION PROCEDURES MAY EXIST. POLE FOUNDATIONS MAY NEED TO BE REANALYZED ACCORDING TO THE SOIL CONDITIONS THAT EXIST.

IF ANY DISCREPANCIES OR INCONSISTENCIES ARISE, NOTIFY THE ENGINEER OF SUCH DISCREPANCIES. FOUNDATIONS WILL THEN BE REVISED ACCORDINGLY.

ALL PRECAST BASES AND CONCRETE BACKFILL MUST BEAR ON AND AGAINST FIRM, UNDISTURBED SOIL OR AS APPROVED BY THE GEOTECHNICAL ENGINEER.

ALL EXCAVATIONS MUST BE FREE OF LOOSE SOIL AND DEBRIS PRIOR TO FOUNDATION INSTALLATION AND PLACEMENT OF CONCRETE BACKFILL. CASING MAY BE REQUIRED IF CAVING OCCURS. IN SUCH A CASE, APPROVAL BY THE GEOTECHNICAL ENGINEER IS REQUIRED.

ALL EXCAVATIONS MUST BE FREE OF WATER OR CONCRETE SHALL BE PLACED WITH A TREMIE PIPE IN ACCORDANCE WITH ACI STANDARD 336. CONCRETE PLACED BY THE TREMIE METHOD UNDER WATER, SHALL HAVE A MINIMUM ULTIMATE STRENGTH OF 1,000 PSI GREATER THAN REQUIRED UNDER "CONCRETE BACKFILL" BELOW.

CONCRETE BACKFILL

CONCRETE BACKFILL SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH AT 28 DAYS OF 3,000 PSI (CONCRETE DESIGNED BASED ON 2,500 PSI; CONTINUOUS SPECIAL INSPECTION NOT REQUIRED).

CONCRETE BACKFILL SHALL ATTAIN A MINIMUM STRENGTH OF 2,000 PSI PRIOR TO STEEL POLE ERECTION.

USE TYPE II/V PORTLAND CEMENT OR AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

MIX IN CONFORMANCE WITH ASTM C-94

AGGREGATES PER ASTM C-33. .(1" MAX AGG. SIZE)

PLACE CONCRETE IMMEDIATELY AFTER COMPLETION OF EXCAVATION AND INSPECTION BY THE GEOTECHNICAL ENGINEER. NO EXCAVATIONS SHALL BE LEFT UNPROTECTED OR OPEN OVERNIGHT.

CONCRETE SHALL BE PLACED IN ONE CONTINUOUS OPERATION (NO CONSTRUCTION JOINT) TO GRADE WITH A TREMIE PIPE, WITH A MAXIMUM FREEFALL OF 4 FT AND TO PREVENT CONCRETE FROM STRIKING THE SIDES OF THE EXCAVATION. VIBRATE TOP 5 FT.

MISCELLANEOUS

FIXTURES MUST BE LOCATED TO MAINTAIN 10'-0" MINIMUM HORIZONTAL CLEARANCE FROM ANY OBSTRUCTION.

POLES, FIXTURES, PRECAST BASES, ELECTRICAL ITEMS, SPECIFICATIONS, AND INSTALLATION PER MUSCO LIGHTING, INC.

FIXTURE: EPA = 2.2 MAX SQ FT; WEIGHT = 40.0 LBS (PER MUSCO LIGHTING, INC.)

POLE SUPPORT FOUNDATION	MUSCO LIGHTING, INC. 2107 STEWART ROAD MUSCATINE, IOWA 52761	DATE: 08/23/13
555 MAPLE AVE SOCCER AREA LIGHTING TORRANCE, CA	R. L. FOLEY & ASSOCIATES, INC. STRUCTURAL ENGINEERS 25652 ASHBY WAY LAKE FOREST, CA 92630	SHEET C1 OF 1

CITY OF TORRANCE

GRADING PLAN NOTES

1. Grading operations shall be conducted in accordance with the code of the City of Torrance and all revisions thereto.
2. A Pre-Job meeting with the Grading Inspector, (310) 618-5915, is required prior to the start of grading operations. Subsequent inspections shall be requested in accordance with the Inspector's instructions of the first inspection.
3. Estimated earthwork yardage including recompaction of sumps or existing loose fill:

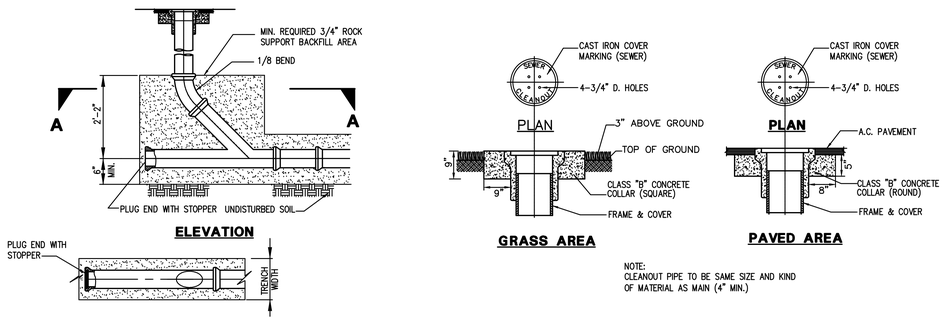
Fill in Lots:	_____	Cubic Yards
Maximum Depth of Fill	_____	Feet
Cut in Lots:	_____	Cubic Yards
Maximum Depth of Cut:	_____	Feet
Overexcavation & Recompaction:	_____	Cubic Yards

4. Existing ground upon which fill or base is to be placed shall be cleared of weeds, debris, topsoil, and all other deleterious materials; no fill shall be placed until preparation of the existing ground has been approved by the Soils Engineer of record and by the Inspector.
5. Protective measures shall be taken by the contractor and the owner to protect adjacent property, public and utilities during grading operations. The contractor assumes all liability for the underground utility pipes, conduits, or structures, whether shown or not on the plan
6. Water content shall be controlled as determined by the Soils Engineer and the Inspector.
7. Permission shall be secured from the Engineering Department if the trucks are loaded in the street.
8. Unsuitable material shall be disposed of off-site. The location of dumping excess soil shall be approved by the Grading Inspector prior to starting excavation.
9. If a grading job extends over a period of time exceeding six months, the Department may require planting of those portions of the job where all other grading requirements have been met in order to prevent dust and erosion.
10. Loose material shall not exceed 3" in depth on a filled slope.
11. All slopes so designated shall be planted with an approved perennial for erosion control. Planting shall be sprinklered and maintained until planting has reached mature growth.
12. All loose on site fill shall be removed and compacted.
13. All work shall be accomplished in accordance with recommendations set forth in the soils report by dated _____ and the Geological Report by _____
14. All man-made fill shall be compacted to a minimum 90 percent of the maximum dry density of the fill material per the latest version of ASTM D1557.
15. Sufficient tests of the fill soils shall be made to determine the relative compaction of the fill in accordance with the following minimum guidelines:
    A. One test for each two foot vertical lift.
    B. One test for each 500 cubic yards of material placed.
    C. One test at the location of the final fill slope for each building site (Lot) in each four foot vertical lift of portion thereof.
    D. One test in the vicinity of each building pad for each four foot vertical lift or portion thereof.
16. Import Soils should consist of clean, compactable materials possessing expansion characteristics similar to or better than the upper on-site Soils. Import soils should be free of trash, debris or other objectionable materials. Contractor shall notify the Project Geotechnical Engineer not less than 72 hours in advance of the location of any soils proposed for Import. Each proposed Import source shall be sampled, tested, and approved prior to delivery of soils for use on the site.
17. All fill under the building foundation must be certified by the Soils Engineer as to proper bearing value design and its compliance with the preliminary soils report on note 13.
18. All subgrade under areas to be paved shall be certified by the Soils Engineer in compliance with Section 81.2.34(g) of the Torrance Municipal Code.
19. The engineering Geologist, Soils Engineer and Civil Engineer, in compliance with Section 81.2.37(g) of the Torrance Municipal Code, shall provide the Department with a grading certification upon completion of the job.
20. An as-graded plan prepared by the Civil Engineer of record shall be submitted with the required grading certifications to the Department upon job completion.
21. Approval of this plan is for grading and paving on site only and does not constitute approval of any building, wall or other structure shown on site nor any off-site improvements shown.
22. No fill shall be placed during unfavorable weather conditions. The Soils Engineer and Grading Inspector shall verify moisture content and density prior to placement of additional fill after heavy rains.
23. All construction in public right of way shall be under separate permit and approved by the Engineering Department.

NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) REQUIREMENTS

1. Owner shall keep the construction area sufficiently dampened to control dust caused by grading and construction. Owner shall, at all times, provide reasonable control of dust caused by wind.
2. The export or import material in each truckload shall be kept low enough to prevent spillage and shall be sufficiently wet down to prevent dust.
3. A staging area shall be designated where each truck is prepared for road travel and all loose material removed. Any substance to drop from the body, tires, or wheels of any vehicle upon the public right of way shall be removed immediately and permanently.
4. Erosion control measures shall be in place from November 15 through April 15.

Rev. 8/9/01



NOTE:
CLEANOUT PIPE TO BE SAME SIZE AND KIND OF MATERIAL AS MAIN (4" MIN.)

44 **SEWER CLEANOUT DETAIL**

NOT TO SCALE

SITE DEMOLITION NOTES

- A — PROTECT IN PLACE EXISTING CONCRETE SIDEWALK.
- B — PROTECT IN PLACE EXISTING TREE OR LANDSCAPE.
- C — PROTECT IN PLACE EXISTING IRRIGATION METER AND CONTROLLER.
- D — PROTECT IN PLACE EXISTING WATER METER AND CONTROLLER.
- E — PROTECT IN PLACE EXISTING PARKING LOT LIGHT.
- F — PROTECT IN PLACE EXISTING ELECTRICAL BOX.
- G — PROTECT IN PLACE EXISTING 8" BLOCK WALL.
- H — PROTECT IN PLACE EXISTING POWER POLE.
- I — PROTECT IN PLACE EXISTING UNDERGROUND ELECTRICAL.
- J — PROTECT IN PLACE EXISTING UNDERGROUND GAS.
- K — PROTECT IN PLACE EXISTING UNDERGROUND ELECTRICAL VAULT AND MANHOLE.
- L — PROTECT IN PLACE EXISTING UNDERGROUND TELECOMMUNICATION MANHOLE.
- M — PROTECT IN PLACE EXISTING FIRE HYDRANT.
- N — PROTECT IN PLACE EXISTING BOLLARD INCLUDING ANY FOOTING.
- O — PROTECT IN PLACE EXISTING STORM DRAIN, CATCH BASIN AND MANHOLE.
- P — PROTECT IN PLACE EXISTING SEWER LINE.
- Q — PROTECT IN PLACE EXISTING CONCRETE CURB.
- R — PROTECT IN PLACE EXISTING CONCRETE CURB AND GUTTER.
- S — PROTECT IN PLACE EXISTING CONCRETE DRIVEWAY.
- T — PROTECT IN PLACE EXISTING STREET SIGN.

- 3 — REMOVE PORTION EXISTING MOWSTRIP.
- 4 — REMOVE EXISTING CHAIN LINK FENCE.
- 5 — REMOVE EXISTING LIGHT BASE AND CAP ASSOCIATED EXISTING ELECTRICAL CONNECTIONS PER THE DRY UTILITY CONSULTANTS RECOMMENDATIONS.
- 6 — REMOVE EXISTING 8" BLOCK WALL AND ASSOCIATED CHAIN LINK FENCE, INCLUDING ALL FOOTINGS AND STRUCTURAL REBAR.
- 7 — REMOVE EXISTING TREES AND LANDSCAPE PLANTING PER THE RECOMMENDATIONS OF THE LANDSCAPE ARCHITECT. REMOVALS WILL INCLUDE THE ENTIRE ROOT BALL FOR THE PLANTS.
- 8 — REMOVE EXISTING ON-SITE FIRE DEPARTMENT CONNECTIONS; INCLUDING ANY WATER LINES, THRUST BLOCKS, FITTINGS, VALVES, FIRE HYDRANT, VAULT AND POST INDICATOR VALVES PER CITY DEPARTMENT STANDARD.
- 9 — REMOVE EXISTING AC PAVEMENT IN PARKWAY FOR TURF INSTALLATION PER LANDSCAPE PLAN.
- 10 — SAWCUT EXISTING CONCRETE GUTTER, AND REMOVE EXISTING CURB AND GUTTER AND SIDEWALK AS REQUIRED TO INSTALL A NEW HANDICAPPED ACCESS RAMP PER GRADING PLANS. REMOVE ENTIRE CONCRETE GUTTER SPANDREL IF REQUIRED BY CITY INSPECTOR.

PRECISE GRADING, DRAINAGE AND UTILITY CONSTRUCTION NOTES

1. CONSTRUCT CONCRETE SIDEWALK PER CITY OF TORRANCE STD. T102. REPLACE LIFTED, GRINDED AND CRACKED SECTIONS PER CITY INSPECTOR.
2. JOIN EXISTING CONCRETE SIDEWALK PER DETAIL ON SHEET C-D1.
3. INSTALL BLOCK RETAINING WALL, TOP OF FOOTING, TOP OF WALL PER PLAN. SEE LANDSCAPE PLANS FOR MATERIAL SPECIFICATIONS AND STRUCTURAL PLANS FOR CONSTRUCTION DETAILS.
4. CONSTRUCT WHEEL CHAIR ACCESS RAMP PER SPPWC STD. 111.
5. CONSTRUCT HEADER PER LANDSCAPE PLANS
6. INSTALL HARDCAPE, WALKS, AND STAIRS PER LANDSCAPE PLANS
7. CONSTRUCT FENCE AND GATES PER LANDSCAPE PLANS
19. INSTALL 6" ROUND DECK DRAIN, NDS OR EQUAL
20. INSTALL 12"X12" BROOKS BOX PER DETAIL ON SHEET C-D1
21. INSTALL 36"X36" BROOKS BOX PER DETAIL ON SHEET C-D1.
23. INSTALL 12" DIA. SDR 35 PVC DRAINPIPE.
24. INSTALL 10" DIA. SDR 35 PVC DRAINPIPE.
25. INSTALL 8" DIA. SDR 35 PVC DRAINPIPE.
26. INSTALL 6" DIA. SDR 35 PVC DRAINPIPE.
27. INSTALL 4" DIA. SDR 35 PVC DRAINPIPE.
28. CONNECT STORM DRAIN PIPE TO EXISTING CATCH BASIN PER SPPWC STD. 332 CASE 1 DETAIL ON SHEET C-D1.
29. INSTALL 1"X12" FLOAT COMPOSITE SUBDRAIN PER ASTROTURF DETAIL ON SHEET C-D4. INSTALLED WITH FLOWLINE 7" BELOW FINISHED GRADE ON PLANS
30. INSTALL 8" PERFORATED SDR 35 PVC SUBDRAIN PER ASTROTURF DETAIL ON SHEET C-D4, INVERT PER PLAN.
31. INSTALL 10" PERFORATED SDR 35 PVC SUBDRAIN PER ASTROTURF DETAIL ON SHEET C-D4, INVERT PER PLAN.
32. CONNECT PEFORATED SUBDRAIN PIPE TO SOLID AREA DRAIN PIPE.
33. INSTALL 12"X12" GRATED AREA DRAIN INLET, NDS OR APPROVED SIMILAR PER DETAIL ON SHEET C-D1
34. INSTALL 4" PERFORATED SDR 35 PVC SUBDRAIN PER ASTROTURF DETAIL ON SHEET C-D4, INVERT PER PLAN
35. INSTALL 6" PERFORATED SDR 35 PVC SUBDRAIN PER ASTROTURF DETAIL ON SHEET C-D4, INVERT PER PLAN
36. INSTALL 4" PERFORATED WALL SUBDRAIN PER DETAIL ON SHEET C-D4 AND PER GEOTECHNICAL REPORT AND STRUCTURAL DETAILS AS REQUIRED.
36. INSTALL 12"X12" GRATED AREA DRAIN INLET, NDS OR APPROVED SIMILAR PER DETAIL ON SHEET C-D1
37. INSTALL 12"X12"X4" PVC TEE WITH 4" OUTLET DIRECTED DOWN FOR LOW FLOW DIVERSION
38. INSTALL TRITON 180 FILTER INSERT TR14-180 (32") INSIDE 36"X36" BASIN PER DETAIL ON SHEET C-D1
39. INSTALL WATER QUALITY INFILTRATION TRENCH PER DETAIL ON SHEET C-D4
40. INSTALL 2" WATER SERVICE & 2" METER BOX PER CITY OF TORRANCE STD. NO. T-702.
41. INSTALL 2" REDUCED PRESSURE PRINCIPLE DETECTOR ASSEMBLY PER CITY OF TORRANCE STD. NO. 7-711.
42. REMOVE PLUG AND JOIN EXISTING 10" SEWER STUB
43. INSTALL 10" VCP SEWER LATERAL PER CITY OF TORRANCE STANDARD T-204 AND T116, AND SPPWC STD. 222..
44. INSTALL 4" SEWER CLEANOUT PER CITY OF TORRANCE STANDARDS AND DETAIL ON SHEET C-D5
45. INSTALL 4" SDR 35 PVC SEWER LATERAL PER CITY OF TORRANCE STANDARD T-204
46. JOIN RESTROOM PLUMBING SEWER POC
47. SAWCUT AND REMOVE EXISTING AC PAVEMENT/ CONCRETE IMPROVEMENTS FOR UTILITY TRENCH AND REPLACE IN KIND PER CITY OF TORRANCE STANDARDS
48. JOIN EXISTING WATER METER AND/OR COORDINATE ¾ INCH METER INSTALLATION WITH CITY OF TORRANCE.
49. INSTALL 1/2 INCH TYPE L, HARD DRAWN COPPER WATER SERVICE
50. JOIN RESTROOM PLUMBING WATER POC

6-27-13 TERRY P. AU RCE 68466 EXP. 9/30/13
DATE

REGISTERED PROFESSIONAL ENGINEER TERRY P. AU C 68466 EXP. 9-30-13 CIVIL STATE OF CALIFORNIA

REVISIONS

SPORTS FIELDS AT 555 MAPLE AVENUE

City of Torrance, California 90503

Sections & Details

City of Torrance
3031 Torrance Blvd.
Torrance, CA 90503
(310) 781-7559

23 MAUCHLY, SUITE 110
IRVINE, CALIFORNIA 92618
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949.727.9098 FAX
www.URBRESOURCE.COM
URBAN RESOURCE
CONSULTING CIVIL ENGINEERS

project manager:

approved by:

drawn by:

date:

scale:

SHEET

C-D5 of XX

City of Torrance: 555 Maple Sports Field

P:\74.383\GRADING\383-PC-DETAILS.dwg
PLOT DATE - Sep 10, 2013 - 12:26PM

PLAN CONTROL | PLAN SET: PC4
CITY OF TORRANCE | DATE: 8-14-2013

SECTION 16500 - LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: All labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete, as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to, the following:

1. Examine all other sections for work related to those other sections and required to be included as work under this section.

2. General provisions and requirements for electrical work.

1.2 SUBMITTALS

A. Shop drawings:

1. For special assemblies. Musco Sports Lighting product shall be supplied to city directly. No alternates shall be accepted.

B. Product data:

1. Lighting:

a. Names of manufacturers, cuts, catalog numbers and photometric performance data and iso-footcandle plots where applicable of all lighting fixtures to be used on project.

b. Identify fixtures by Fixture Schedule number, including special notations for finishes, colors, and mountings.

C. Contract closeout information:

1. 5 year warranty for LED drivers and chips.

2. 5 year warranty of paint finish

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES - GENERAL

A. Acceptable manufacturers:

1. Lighting fixtures:

a. Base:

1) As indicated on Fixture Schedule.

2. Contactors:

a. Base:

1) Schneider Electric/Square D.

2) Eaton Electrical.

3) General Electric.

4) Allen-Bradley.

3. Rigid PVC conduit:

a. Base:

1) As specified in Section 16111.

B. All lighting fixtures and electrical components: UL labeled and DLC approved.

C. Luminaire and pole assemblies: As scheduled.

D. Poles: Steel, designed for 100 MPH constant velocity wind load.

1. Include base template, 4 anchor bolts, cadmium-plated hardware and pole grounding lug, handhole, cast steel anchor base and bolt covers.

E. Pole foundations: As indicated.

F. Underground wiring:

1. Type THHN or THWN installed in rigid PVC conduit.

2. Provide all wiring runs with separate green equipment grounding conductor, and ground all pole bases.

G. Pole wiring from base to driver: No.10 type THHN/THWN, each phase protected by a 30 A, 600 volt type Tron waterproof fuseholder, Bussmann "Limitron" type, size rating 3-times load current.

H. Contactors: Electrically held type, rated at 600 volts AC, 30 ampere lighting load, minimum with number of poles required, 120/277-volt operating coil (as required per plan), designed for tungsten, metal halide, and LED lamp loads.

1. Installed inside meter pedestal.

2.2 LAMPS

A. Light Emitting Diodes (LED) lamps:

1. LED Light Engines.

a. LED’s shall have a maximum correlated color temperature of (CCT) 4000 degrees Kelvin.

b. Minimum color rendering index (CRI) for clear lamps is 70.

c. Minimum system Lumen Per Watt (LPW) ratio shall be equal to or greater than 80 LPW

2. Luminaires: As indicated in fixture schedule.

2.3 SPARE

A. Deliver to SCRRA spare lumenaire in quantities as follows:

1. 2 of each lumenaire type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all roadway, walkway and parking lighting, and their wiring as indicated.

B. Make conduit bends without injuring conduit or reducing internal diameter.

3.2 ADJUST AND CLEAN

A. Wipe all lighting fixture reflectors, lenses, lamps and trims, clean, after installation. All fixtures shall be installed with caution so as to avoid any fingerprints or smudges on surfaces of parabolic louvers and downlight reflectors. Any fixtures with fingerprints or smudges shall be cleaned.

B. Replace all lamps operated during construction period with new lamps prior to final acceptance.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Light poles including concrete foundation shall be measured by the unit or fraction thereof installed in accordance with the Contract Documents and as measured by the Engineer. The quantities as contained on the Schedule of Quantities and Prices or approved Schedule of Values as derived from the plans will be used as the basis for this measurement.

4.2 PAYMENT

A. This price shall be full compensation for furnishing all labor, materials, tools, equipment, supplies, supervision, and incidentals necessary for Light pole assemblies described by the Contract Documents.

Item No.	Description	Pay Unit
16-05000.01	FIXTURE TYPE 'A' - SITE LIGHT/ POLE/FITTER	Each
16-05000.01	FIXTURE TYPE 'B' - SITE LIGHT/FITTER	Each
16-05000.01	METER PED 400A	Each

END OF SECTION

SECTION 16110 - CONDUIT AND WIRE

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: All labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to the following:

1. Examine all other sections for work related to those other sections and required to be included as work under this section.

2. General provisions and requirements for electrical work.

1.2 SUBMITTALS (ADDITIONAL REQUIREMENTS)

A. Submit product data sheets for all wire, supports, conduit, fittings and splicing materials and wiring devices.

B. Submit material list for all conduit and conduit fittings.

C. Submit details and structural engineering calculations for conduit support systems.

PART 2 - PRODUCTS

2.1 RACEWAYS AND CONDUITS

A. General

1. The interior surfaces of conduits and fittings shall be continuous and smooth, with a constant interior diameter. Conduits and conduit fittings shall provide conductor raceways of fully enclosed circular cross section. The interior surfaces of conduits and fittings shall be without ridges, burrs irregularities or obstructions. Conduits and fittings of the same type shall be of the same uniform weight and thickness.

2. Type of conduit, type of conduit fittings and conduit supports shall be suitable for the conditions of use and the conditions of location of installation, based on the manufacturer's recommendations and based on applicable codes.

B. Rigid Non Metallic Conduit (RNMC)

1. General

a. Conduit and fittings shall be 90 degree centigrade conductor rated. Fabricated from homogeneous material, free from visible cracks holes or foreign inclusions, with integral "end-bell". The conduit and conduit fittings shall be watertight and airtight.

b. Conduit, conduit fittings and conduit fitting assembly "solvent cement" shall all be the product of the same manufacturer. Conduit fittings shall be solvent cement welded watertight.

c. Conduit and fittings shall be identified with legible markings showing ratings, size and manufacturer's name.

d. RNMC and fitting shall be corrosion resistant, watertight.

e. Conduit shall be suitable for conductor operating temperatures from minus 20 degrees centigrade to 90 degrees centigrade.

f. RNMC shall comply with NEMA TC-2 (PVC 40 conduit, latest revision) NEMA TC-6 (EB conduit latest revision) and NEMA TC-3 (fittings, latest revision); UL 514 and UL 651 (latest revision).

2. Polyvinyl Chloride (PVC)-RNMC

a. PVC-schedule 40 heavy wall construction.

2.2 CONDUIT SUPPORTS

A. Not applcable

2.3 WIRE AND CABLE

A. All wire and cable shall be copper, 600 volt, #10 AWG minimum unless specifically noted otherwise on the drawings. Conductors #10 AWG and smaller shall be solid. Conductors #8 AWG and larger shall be stranded. Type of insulation as noted on drawings as follows: Insulation of conductor connected to circuit protection devices required to be "100%" rated, shall be 90 degree rated insulation:

1. Type THHN/THWN insulation used for #4 AWG and smaller.

2. Type THW/XHHW or THHN/THWN insulation used for #2 AWG and larger.

3. Type THW or XHHW insulation used for all panel feeders switchboard feeders, motor control center feeders, transformer feeders and service conductors.

4. Type THHN insulation used for circuit conductors installed in fluorescent lighting fixture raceways, for conductors connected to the secondary of metal halide fixture ballast or other hot locations.

5. Type XHHW or THWN insulation shall be used where conductors are installed in conduit exposed to the outdoor weather.

6. The following color code for branch circuits:

a. Neutral . . . . White (Tape feeder neutrals with white tape near connections)

b. Normal Power

240/120 Volt
Ground: Green
Phase A: Black
Phase B: Red
Phase C: Blue

7. Feeders identified as to phase or leg in each panelboard with printed identifying tape.

PART 3 - EXECUTION

3.1 TRENCHING, FOOTINGS, SLEEVES

A. Provide trenching, concrete encasement of conduits, backfilling, and compaction for the underground electrical work, in accordance with applicable sections of this specification.

B. Provide footings for all post and/or pole-mounted lighting fixtures: concrete shall conform to the applicable sections of this specification.

3.2 GROUNDING

A. Grounding shall be executed in accordance with all applicable codes and regulations, both of the State of California and local authorities having jurisdiction.

B. Where nonmetallic conduit is used in the distribution system, the CONTRACTOR shall install the proper sized copper ground wire in the conduit with the feeder for use as an equipment ground. The electrical metallic raceway system shall be grounded to this ground wire.

C. The maximum ground/bond resistance to the grounding electrode shall not exceed 1 ohms from any location in the electrical system. The maximum ground resistance of the grounding electrode to earth shall not exceed 5 ohms.

D. Ground/Bond Conductors

1. Provide an additional, dedicated, green insulation equipment ground/bond wire inside each conduit type as follows. The metal conduit shall not be permitted to serve (function) as the only (exclusive) electrical ground return path:

   a. All types of nonmetallic conduit raceways including but not limited to: RNMC - Rigid Nonmetallic Conduit.

   b. FMC - Flexible Metal Conduit.

   c. LTFMC - Liquid Tight Flexible Metal Conduit.

2. The equipment ground/bond wire shall be continuous from the electrical circuit source point of origin to the electrical circuit end termination utilization point as follows:

   a. Every conduit path containing any length of the above identified conduits.

   b. Every conduit path connected to any length of the above identified conduits.

3. The equipment ground/bond wire shall be sized as follows, but in no case smaller than indicated on the drawings. Install equipment ground/bond wire in each conduit/raceway, with the respective phase conductors:

Feeder, Subfeeders & Branch Circuit Protection	Minimum Equipment Ground Wire Size
15 Amp	#12
20 Amp	#12
30 to 50 Amp	#10
70 to 100 Amp	#8
101 to 200 Amp	#6
201 to 400 Amp	#2

4. Splices in ground/bond wires shall be permitted only at the following locations:

   a. Ground buses with listed and approved ground lugs.

   b. Where exothermic welded ground/bond wire splices are provided.

5. Provide ground/bond wire jumpers for conduit fittings with ground lugs, expansion and deflection conduit fittings and to bond metal enclosures to conduit fittings with ground lugs.

E. Where conductors are run in parallel in multiple raceways, the grounding conductor shall be run in parallel. Each parallel equipment grounding conductor shall be sized on the basis of the ampere rating of the overcurrent device protecting the circuit conductors in the raceway. When conductors are adjusted in size to compensate for voltage drop, grounding conductors, where required, shall be adjusted proportionately in size.

F. Ground conductors for branch circuit wiring shall be attached at each outlet to the back of the box using drilled and tapped holes and washer head screws, 6-32 or larger.

G. Each panelboard, switchboard, pull box or any other enclosure in which several ground wires are terminated shall be equipped with a ground bus secured to the interior of the enclosure. The bus shall have a separate lug for each ground conductor. No more than one conductor shall be installed per lug.

3.3 CONDUIT

A. General

1. The sizes of the conduits for the various circuits shall be as indicated on the drawings, but not less than the conduit size required by code for the size and quantity of conductors to be installed in the conduit.
2. Conduits shall be installed concealed from view. Install conduits concealed in walls, concealed in/below floors and concealed above ceilings, except as specifically noted otherwise.
3. Conduits shall be provided complete with conduit bends, conduit fittings, outlet boxes, pullboxes, junction boxes, conduit anchors/supports, grounding/bonding for a complete and operating conductor/wire raceway system.
4. Metal and nonmetal conduits shall be provided mechanically continuous between termination connection points. Metal conduit shall be provided electrically continuous between termination connection points.
5. Individual conduits paths and home runs shown on the drawings shall be maintained as separate individual conduits for each homerun and path.
6. Transitions between conduits constructed of different materials and occurring in above grade locations shall be allowed only at outlet boxes, junction boxes, pull boxes and equipment enclosures unless specifically indicated otherwise. Provide outlet boxes and junction boxes.
7. Metal conduit terminating to nonmetal enclosures and terminating into metal enclosures with “concentric.ring” knockouts; including but not limited to equipment housings, outlet boxes, junction boxes, pull boxes, cable trenches, manholes, shall be provided with a ground/bonding lug integrated with the conduit termination conductor fitting construction, by the fitting manufacturer. The lug shall provide for connection of a grounding/bonding conductor (insulated or uninsulated). The grounding lug shall be located on the fitting, inside the termination enclosure.
8. The type of conduit, type of conduit fittings, and type of conduit supports and method of conduit installation shall be suitable for the conditions of use and conditions of location of installation based on the manufacturer’s recommendations; based on the applicable codes and based on the requirements of the contract documents.
9. Conduit Separation:

a. Conduit installed underground or below building slab without full concrete encasement shall be power to power, control to control etc.) by a minimum of 3 inches.

b. Conduit installed underground with full concrete encasement; shall be separated from adjacent conduits of similar systems (100 volt and less) by a minimum of 2 inches; conduits

c. Separation of conduits entering termination points or crossing other conduits may be reduced as required within 60 inches of the termination or crossing points.

d. Conduits containing Utility Company service circuits (i.e. electrical power, telephone, or cable television) shall be separated a minimum of 12 inches from all other utilities and conduits, with or without concrete encasement; metallic or non-metallic conduit, above grade or underground conduit locations. Verify with serving utility companies.

e. Conduits shall be separated from hot water piping, exhaust flues/chimnies, steam piping, boilers, furnaces, ovens by a

10. Conduit Concrete Encasement

a. Conduits less than minimum depth required by code shall be concrete encased to provide mechanical protection. Concrete for encasement of underground conduits shall be 2000 PSI 28 days cure strength with a maximum of 3/4" gravel. Concrete encasement of conduits shall be continuous without voids. The encasement shall extend 3-inches past the edges of all conduits on all sides of the circuit. Provide ten pounds of red oxide cement coloring uniformly mixed with each cubic yard of concrete for conduit encasement.

11. Underground Conduits

a. Three or more underground conduits larger than 1" in size and occupying the same trench shall be separated and supported on factory fabricated, non-metallic, duct/conduit support spacers. The spacers shall be modular, keyed interlocking type, "built-up" to accommodate quantity, size orientation and spacing of installed conduits. The spacers shall maintain a constant distance between adjacent conduit supports and hold conduits in place during trench backfill operations. Minimum support spacer installation interval along with length of the conduits shall be as follows:

1) Concrete encased conduits, not less than 8 ft. on center.

2) Non-concrete encased conduits, not less than 5 ft. on center.

b. Provide trenching, excavation, shoring and Backfilling required for the proper installation of underground conduits.

c. Bottoms of trenches shall be cut parallel to “finish grade” elevation. Make trenches 12 inches wider than the greatest diameter of the conduit.

d. Backfilling Trenches for Conduits

1) Conduits which are not concrete encased and are located exterior to building slab shall be set on a 3 inch bed of damp sand. Conduit trenches shall be backfilled to within 12 inches of finished grade with damp sand after installation of conduit and concrete is completed. Remainder of backfill shall be native soil. Soil shall have no stones or aggregate greater than 3". Backfill shall be machine vibrated in 6 inch lifts to provide not less than 90 percent compaction. Provide a continuous yellow 12 inch wide flat plastic tracer tape, located 6 inches above the conduits in the trench. The tracer tape shall be imprinted with "Warning-Electric Circuits" a minimum of 24 inches on center.

2) Do not backfill until installation has been approved by City Inspector and as-built drawings are up to date. Promptly install conduits after excavation has been done, so as to keep the excavations open as short a time as possible. Excess soil from trenching shall be removed from the site.

e. Install underground conduit, except under buildings, not less than 24" below finished grade. Dimensions shall be measured to the top of the conduit.

f. Provide long radius horizontal bends (minimum radius of 36 times the conduit diameter) in underground conduits where the conduit is in excess of 100 feet long.

g. Conduits installed below grade and on grade below buildings, shall not be smaller than 0.75 inches.

h. Underground conduits entering a building shall be sloped. The conduit direction of slope shall be away from the building, and shall prevent water in the conduit from "gravity draining" towards the building. The conduit slope "high point" shall originate from the building, out to the first exterior pullbox, manhole etc. exterior conduit termination "low point". The minimum slope angle shall be a constant 8 inches (or greater) of fall for each 100 feet of conduit length.

i. Dewatering

1) Provide pumping to remove, maintain and dispose of all water entering the excavation during the time the excavation is being prepared, for the conduit laying, during the laying of the conduit, and until the backfill at the conduit zone has been completed. These provisions shall apply on a continuous basis. Water shall be disposed of in a manner to prevent damage to adjacent property. Trench water shall not be drained through the construction. Groundwater shall not be allowed to rise around the pipe until joining compound has firmly set.

2) The Owner shall be notified 48 hours prior to commencement of dewatering.

12. Raceway/Conduits which are installed at this time and left empty for future use shall have 0.25 inch diameter polyvinyl rope left in place for future use. The pull rope shall be 500 pound minimum tensile strength. Provide a minimum of 5 feet of slack at each end of pull ropes.

13. Unless otherwise restricted by structural drawings and specifications, the maximum size conduit permitted in slabs, walls ceilings and roofs constructed of masonry or concrete shall not be greater than 25 percent of the concrete/masonry thickness. Conduits installed in these locations shall not cross.

14. Conduit Bends and Offsets

a. The minimum bend radius of “factory or field” fabricated conduit bends shall not be less than the following. The bend radius shall be measured at the surface, inside radius of the conduit wall.

1) RNMC conduit - conduit minimum bend radius 36 times the conduit inside diameter.

2) Conduits for utility company conductors. Conduit minimum bend radius shall comply with the respective utility company requirements.

b. Bends and offsets in conduits shall be kept to an absolute minimum. The total summation of all bends and offsets permitted in a conduit segment, occurring between two conduit termination/connection end points, shall not exceed the following, including conduit fittings:

1) RNMC conduit - 270 angular degrees

c. Each field fabricated conduit offset, bend and elbow which are not the standard product of the raceway/conduit manufacturer shall be mandrel tested. The test shall be conducted after the conduit installation is complete and prior to pulling-in any wire, in the same manner as for underground conduits.

d. Factory manufactured angle connector conduit fittings shall be installed in exposed conduit locations only. Installation in locations normally concealed from view shall not be permitted. Not more than one (1) factory manufactured angle connector shall be permitted in any length of conduit between conduit termination end points.

e. If (3) three or more conduit-bends of the same conduit size and same conduit material type, installed, as part of the contract work, fail to comply with the required minimum conduit bend radius or conduit angular degree limits. The following corrective actions shall occur:

1) The CONTRACTOR shall remove all the non-complying conduit bends and the respective wire in the conduit from the project site. Provide new conduit and wire, complying with the contract documents.

2) Where the conduit bends similar to the non-complying conduit bends are installed concealed in walls, floors, above ceilings or below grade, the Contractor shall expose the conduit bends to allow visual observation.

3) All the costs to correct the deficient material and work along with costs to repair the direct, indirect, incidental damages and contract delays shall be the sole responsibility of the CONTRACTOR and shall be included in the bid price.

3.4 WIRE AND CABLE

A. Branch circuit and fixture joints for #10 AWG and smaller wire shall be made with UL-approved connectors listed for 600 volts, approved for use with copper and/or aluminum wire. Connector to consist of a cone-shaped, expandable coil spring insert, insulated with a nylon shell and 2 wings placed opposite each other to serve as a built-in wrench or shall be molded one-piece as manufactured by 3M-"Scotchlok".

B. Branch circuit joints of #8 AWG and larger shall be made with screw pressure connectors made of high strength structural aluminum alloy and UL-approved for use with both copper and/or aluminum wire as manufactured by Thomas & Betts. Joints shall be insulated with plastic splicing tape, tapered half-lapped and at least the thickness equivalent to 1.5 times the conductor insulation. Tapes shall be fresh and of quality equal to Scotch.

C. Use U.L. listed pulling compound for installation of conductors in conduits.

D. Correspond each circuit to the branch number indicated on the panel schedule shown on the drawings except where departures are approved by the ENGINEER.

E. All wiring, including low voltage, shall be installed in conduit.

F. Control wiring to conform to the wiring diagrams shown on the mechanical drawings and the manufacturer's wiring diagrams.

G. All splices in exterior pull boxes and light poles shall be cast resin encapsulated.

1. Power conductor splices - 3M Scotchcast Series 82/85/90; Plymouth or equal.

2. Control and signal circuits 3M Scotchcast series 8981 thru 8986, Plymouth or equal.

H. Neatly group and lace all wiring in panelboards, motor control centers and terminal cabinets with plastic ties at 3" on centers. Tag all spare conductors.

3.5 TESTING

A. Testing Conduit and Conduit Bends

The CONTRACTOR shall demonstrate the usability of all underground raceways, and field fabricated conduit bends installed as part of this contract.

1. A round tapered segmented semi-rigid mandrel with a diameter approximately 1/4 inch smaller than the diameter of the raceway, shall be pulled through each new raceway.

2. The mandrel shall be pulled through after the raceway installation is completed. Conduits which stubout only, may have the mandrel pulled after the concrete encasement is completed, but prior to completing the backfill.

3. The raceway testing for usability shall be witnessed by ENGINEER. The raceway testing shall be witnessed by a representative of the Respective Utility Company where applicable.

4. CONTRACTOR shall repair/replace any conduit and conduit bend provided under this contract which will not readily pass the mandrel during this test.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Conduits shall be measured by the unit or fraction thereof installed in accordance with the Contract Documents and as measured by the Engineer. The quantities as contained on the Schedule of Quantities and Prices or approved Schedule of Values as derived from the plans will be used as the basis for this measurement.

B. Wire and Cable shall be measured by the unit or fraction thereof installed in accordance with the Contract Documents and as measured by the Engineer. The quantities as contained on the Schedule of Quantities and Prices or approved Schedule of Values as derived from the plans will be used as the basis for this measurement.

4.2 PAYMENT

A. Conduits constructed in accordance with the Contract Documents will be paid for at the Contract Unit Price as listed in the Schedule of Quantities and Prices. This price shall be full compensation for furnishing all labor, materials, tools, equipment, supplies, supervision, and incidentals necessary for Conduits described by the Contract Documents.

B. Wire and Cable constructed in accordance with the Contract Documents will be paid for at the Contract Unit Price as listed in the Schedule of Quantities and Prices. This price shall be full compensation for furnishing all labor, materials, tools, equipment, supplies, supervision, and incidentals necessary for Wire and Cable described by the Contract Documents.

C.

Item No.	Description	Pay Unit
16-01110.01	1" PVC SCHEDULE 40 CONDUIT-ELECTRICAL	Linear Foot
16-01110.01	1 1/2" PVC SCHEDULE 40 CONDUIT-ELECTRICAL	Linear Foot
16-01110.01	2" PVC SCHEDULE 40 CONDUIT-ELECTRICAL	Linear Foot
16-01110.01	#10 WIRE THHN/THWN	Linear Foot
16-01110.01	#8 WIRE THHN/THWN	Linear Foot
16-01110.01	#6 WIRE THHN/THWN	Linear Foot
16-01110.01	#2 WIRE THHN/THWN	Linear Foot
16-01110.01	3/16" POLY-PROPYLENE PULL ROPE	Linear Foot

END OF SECTION

SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: All labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to the following:

1. Examine all other sections for work related to those other sections and required to be included as work under this section.

2. General provisions and requirements for electrical work.

1.2 SUBMITTALS (ADDITIONAL REQUIREMENTS)

A. Submit product data sheets for all outlet boxes, wiring devices, device plates, relays, contactors, timeswitches, and disconnects fuses.

B. Submit detailed shop drawings including dimensioned plans, elevations, details, schematic and point-to-point wiring diagrams and descriptive literature for all component parts for relays, time clocks, and photocells.

C. Submit material list for outlet boxes.

PART 2 - PRODUCTS

2.1 OUTLET AND JUNCTION BOXES

A. Not applicable

2.2 PULL BOXES

A. Sizes as indicated on the drawings and in no case of less size or material thickness than required by the governing code. Exercise care in locating underground pull boxes to avoid installation in drain water flow areas.

1. Type 3 ½ minimum concrete pull boxes: Furnish complete with pulling irons, hot-dip galvanized traffic cover with hot-dip galvanized frame and 4 galvanized cable racks with porcelain blocks. The box to be set on a pea gravel base 12" thick and as large as the bottom. Install a 3/4" by 10' copper clad ground rod for grounding all metal parts. After cables have been pulled and inspected, seal box between cover and frame with a mastic compound similar to Parmagum or Dukseal. Construction equal to prefabricated pull boxes as manufactured by Quikset or Brooks Products. Refer to drawings for size. Provide bead weld on cover to pull box to indicate services within pull box (ie - "480/277-VOLT, 3-PHASE, 4-WIRE ELECTRICAL". Size per NEC.

2.3 SWITCHES

1. Not applicable

2.4 RECEPTACLES

1. Not applicable

2.5 PLATES

1. Not applicable

2.6 VANDALPROOF FASTENINGS

A. Provide approved vandalproof type screws, bolts, nuts where exposed to sight throughout the project. Screws for such items as switch plates, receptacle plates, fixtures, communications equipment, blank covers, wall and ceiling plates to be spanner head stainless steel, tamperproof type. Provide OWNER with six (6) screwdrivers for this type.

2.7 STRUCTURAL AND MISCELLANEOUS STEEL

A. Structural and miscellaneous steel used in connection with electrical work and located out-of-doors or in damp locations, to be hot-dip galvanized unless otherwise specified. Included are underground pull box covers and similar electrical items. Galvanizing average 2.0 ounce per square foot and conform to ASTM A123.

2.8 FLASHING ASSEMBLIES

1. Not applicable

2.9 RELAYS, CONTACTORS, AND TIMESWITCHES

A. Individual Control Relays – meter pedestals

1. Individual control relays shall have convertible contacts rated a minimum of 10 amperes, 600 volts regardless of usage voltage. Coil voltage, number and type of contacts shall be verified and supplied to suit the specific usage as shown in the wiring diagrams and/or schedules on the electrical and mechanical drawings. Coil control circuit shall be independently fused, sized to protect coil. Relays shall be installed on prefabricated mounting strips. Each relay shall have a surge suppressor to limit coil transient voltages. Furnished in the NEMA Type I enclosure unless indicated otherwise.

2. The following relays are approved:

Manufacturer	Type
Arrow Hart	IMP
General Electric	Class CR 2811
I.T.E.	Class J10
Square D Co.	Class 8501, Type A
Westinghouse	Bul. 16-321, Type NH
Allen Bradley	Approved Equal

B. Contactors and/or Relays

1. Contactors and/or relays for control of lighting shall be 600 volt A.C., electrically operated, mechanically held units, open type for panel mounting with number of poles and of size as indicated on the drawings. Provide auxiliary control relay for operation of each contactor and/or relay with a two-wire control circuit.

2. Contactors and/or relays shall be mounted in meter pedestal as called for on the drawings. Contactors and/or relays shall be Automatic Switch Co. Bulletin #920 Series for 2 and 3 pole, Automatic Switch Co. Bulletin 917 Series with poles as indicated on drawings. Coil control circuit shall be independently fused, sized to protect coil.

3. Contactors and/or relays shall be equipped with a switch, for manual override. Control circuit switch shall be labeled showing function of device.

4. Verify control voltage prior to ordering.

C. Timeswitches

1. All timeswitches shall be 4-channel, 7-day digital control with battery back-up. Tork #Z400B or equal by Paragon.

2. Timeswitches be equipped with a switch, for manual override. Control circuit switch shall be labeled showing function of device.

3. Verify control voltage prior to ordering.

2.10 DISCONNECTS (SAFETY SWITCHES)

1. Not applicable

2.11 CONCRETE WORK

A. See specification section 12-03300 for concrete.

B. Reinforcement:

1. Bars: Intermediate Grade Steel conforming to ASTM A15-66, with deformations conforming to ASTM A305-65, except #2 bars shall be plain.

2. Welded Wire Fabric: ASTM A185-64.

3. Bending: Conform to requirements of ACI 318-63.

C. Form Material: For exposed work, use PS 1-66 "B-B Concrete Form" plywood forms, or equal. Elsewhere, forms may be plywood, metal, or 1" x 6" boards. Forms for round lighting pole bases shall be sono-tube.

PART 3 - EXECUTION

3.1 GROUNDING (ADDITIONAL REQUIREMENTS)

A. Grounding shall be executed in accordance with all applicable codes and regulations, both of the State of California and local authorities having jurisdiction.

B. Each pull box or any other enclosure in which several ground wires are terminated shall be equipped with a ground bus secured to the interior of the enclosure. The bus shall have a separate lug for each ground conductor. No more than one conductor shall be installed per lug.

C. The maximum resistance to ground shall not exceed 5 ohms.

3.2 OUTLET AND JUNCTION BOXES

1. Not applicable

3.3 CONCRETE WORK

A. Form

1. Space forms properly with spreaders and securely tie together. Do not use twisted wire form ties. Keep forms wet to prevent joints from opening up before concrete is placed. Replace improper construction as directed. Do not use wood inside forms.

2. Build in and set all anchors, dowels, bolts, sleeves, iron frames, expansion joints and other materials required for the Electrical Work. Place all items carefully, true, straight, plumb, and even.

3. Carefully remove all exposed forms. Cut nails and tie wires below face of concrete and fill all holes. Rubbish will not be allowed to remain in, under, or around concrete.

B. Mixing: Use batch machine mixer of approved type. After ingredients are in mixer, mix for at least 1-1/2 minutes.

C. Transit Mixing: In lieu of mixing at site, transit mixing may be used if rate of delivery, haul time, mixing time, and hopper capacity is such that concrete delivered will be placed in forms within 90 minutes from time of introduction of cement and water to mixer.

D. Placing of Concrete:

1. Before placing concrete, remove wood, rubbish, vegetable matter and loose material from inside forms. Thoroughly wet down wood forms to close joints.

2. Clean reinforcement, remove paint, loose rust, scale and foreign material. Bars with bends not called for will be rejected. Hold securely in place to prevent displacement. Lap bar splices 24 diameters, min; lap fabric one mesh min. Tie intersections, corners, splices with 16 ga. annealed wire, or as otherwise called for.

3. Place concrete immediately after mixing. Do not use concrete that has begun to set; no tempering will be allowed. If chuting is used, avoid segregation. In placing new concrete against existing concrete, use bonding agent per manufacturer's directions.

4. Give careful and thorough attention to curing of concrete. Keep concrete and forms wet for a minimum of 10 days, after placing concrete.

E. Concrete Finish:

1. Finish of Exposed Concrete: Horizontal surfaces, steel troweled monolithic finish; vertical surfaces, smooth and free of fins, holes, projection, etc.

2. Exposed lighting pole bases shall be filled and sack finished to a smooth finish.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Wiring devices including outlet boxes, device plates, relays, contactors and disconnects shall be measured by the unit or fraction thereof installed in accordance with the Contract Documents and as measured by the Engineer. The quantities as contained on the Schedule of Quantities and Prices or approved Schedule of Values as derived from the plans will be used as the basis for this measurement.

B. Pullboxes shall be measured by the unit or fraction thereof installed in accordance with the Contract Documents and as measured by the Engineer. The quantities as contained on the Schedule of Quantities and Prices or approved Schedule of Values as derived from the plans will be used as the basis for this measurement.

4.2 PAYMENT

A. Wiring devices including outlet boxes, device plates, relays, contactors and disconnects constructed in accordance with the Contract Documents will be paid for at the Contract Unit Price as listed in the Schedule of Quantities and Prices. This price shall be full compensation for furnishing all labor, materials, tools, equipment, supplies, supervision, and incidentals necessary for Wiring devices including outlet boxes, device plates, relays, contactors and disconnects described by the Contract Documents.

B. Pullboxes constructed in accordance with the Contract Documents will be paid for at the Contract Unit Price as listed in the Schedule of Quantities and Prices. This price shall be full compensation for furnishing all labor, Materials, tools, equipment, supplies, supervision, and incidentals necessary for Pullboxes described by the Contract Documents.

Item No.	Description	Pay Unit
16-00500.01	TYPE 3 PULL BOX-ELECTRICAL	Each
16-00500.01	CONCRETE PARKING LIGHT BASE -ELECTRICAL	Each

END OF SECTION

SECTION 16010 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: All labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete, as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to, the following:

1. Examine all other sections for work related to those other sections and required to be included as work under this section.

2. General provisions and requirements for electrical work.

B. Organization of the specifications into divisions, sections and articles, and arrangement of drawings shall not control the CONTRACTOR in dividing the contract work among subcontractors or in establishing the extent of work to be performed by any trade.

1.2 GENERAL SUMMARY OF ELECTRICAL WORK

A. The specifications and drawings are intended to cover a complete installation of systems. The omission of expressed reference to any item of labor or material for the proper execution of the work in accordance with present practice of the trade shall not relieve the CONTRACTOR from providing such additional labor and materials.

B. Refer to the drawings and shop drawings of other trades for additional details which affect the proper installation of this work. Diagrams and symbols showing electrical connections are diagrammatic only. Wiring diagrams do not necessarily show the exact physical arrangement of the equipment.

C. Before submitting a bid, the CONTRACTOR shall become familiar with all features of the building drawings and site drawings which may affect the execution of the work. No extra payment will be allowed for failure to obtain this information.

D. If there are omissions or conflicts between the drawings and specifications, clarify these points with the ENGINEER before submitting bid.

E. Provide work and material in conformance with the manufacturer's published recommendations for respective equipment and systems.

1.3 LOCATIONS OF EQUIPMENT

A. The drawings indicate diagrammatically the desired locations or arrangements of conduit runs, outlets, equipment, etc., and are to be followed as closely as possible. Proper judgment must be exercised in executing the work so as to secure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structure conditions encountered.

B. In the event changes in the indicated locations or arrangements are necessary, due to developed conditions in the site construction, such changes made without cost, providing the change is ordered before the conduit runs, etc., and work directly connected to same is installed and no extra materials are required.

C. Coordinate and cooperate in every way with other trades in order to avoid interference and assure a satisfactory job.

D. The locations of the existing utilities, building, equipment and conduit shown on the drawings is approximate. Verify exact locations and routing of existing systems by potholing all trench routes prior to digging the trench. Pothole at least 100 feet ahead of the actual trenching to allow space to alter the new conduit routing to accommodate existing conditions.

E. Underground detection services existing utility structures.

1. Services shall be provided utilizing the latest detection equipment available. (Services available from Schockley & Associates, 714-983-1842 or Linville Engineering, 909-989-3922.) Services shall be performed by a company regularly engaged in the business of existing Underground Utility Structure Detection for the past five years.

2. Prior to excavation the following work shall be performed:

a. Contractor to mark trenching locations and indicate width and depth.

b. Locate, by way of vertical and horizontal control dimensions, existing subgrade petroleum product pipes, process piping, conduits, sewer, water, gas, storm drain, electrical, telephone and irrigation lines in the affected areas of contract construction work.

c. Arrange and meet with the Engineer to review existing underground conditions.

3. Exercise extreme caution in excavating and trenching on this site to avoid existing underground utilities, and to prevent hazard to personnel and/or damage to existing underground utilities or structures. These drawings and specifications do not include necessary components for construction safety which is the responsibility of the Contractor.

4. Repair/replace, without additional cost to the contract, and to the satisfaction of the OWNER any work damaged that was identified in the record drawings provided, noted by the representative, or identified by the Underground Deletion Services performed.

5. The Contractor shall contact Underground Service Alert (USA) of Southern California, 1-800-422-4133, at least 48 hours prior to excavation, and shall not excavate until verification has been received from the USA and that public utilities serving the site have been located and marked.

F. The locations of existing underground utilities, where shown on drawings, are shown diagrammatically and have not been independently verified by the OWNER or Engineer. The OWNER and his Consulting ENGINEERS are not responsible for the location of underground utilities or structures, whether or not shown or detailed and installed under this or any other contracts.

1.4 POWER, TELEPHONE AND OTHER SIGNAL SERVICES

A. Telephone, power, and metering facilities shall conform to the requirements of the serving utility companies. CONTRACTOR shall verify service locations and requirements, and shall pay all costs levied by the serving utility companies for rendering utility services to the contract without additional cost to the OWNER. Service information will be furnished by the serving utilities. Comply with requirements of the OWNER'S telephone supplier.

B. Conform to all requirements of the serving utility companies. Location of power pole and routing of service conduits indicated on the drawings are approximate and shall be verified with the serving utility company prior to installation. Installation of service shall not begin until approved drawings have been received from the serving utility company.

C. Within 30 calendar days of receipt of notice that the contract award has been made, the CONTRACTOR shall notify the New Business Departments of the District Office of the serving utility companies concerning the project contract and shall provide information as to the total lighting, power, telephone, and signal requirements of the contract. The CONTRACTOR shall furnish at the same time information as to the estimated completion date of job or the date when the respective utility company circuits, will be ready for installation, energizing and activation of the service.

D. In addition to the requirements of the serving utility companies, all power, telephone and signal service conduits for utility company circuits, shall be completely encased in concrete on all sides, top and bottom or as required by utility companies. The concrete shall be red mix color and extend a minimum of three inches past the conduit.

1.5 PERMITS

A. Take out and pay for all required permits, inspections and examinations without additional cost to the OWNER.

1.6 QUALITY ASSURANCE

A. Work and materials shall be in full accordance with the latest rules and regulations of

1. California Code of Regulations Title 24.
2. California Part 3 "California Electrical Code" CEC, Title 24 and Title 8 "Division of Industrial Safety".
3. The National Electrical Code.
4. The National Life Safety Code.
5. The International Building Code-IBC.
6. National Fire Protection Agency-NFPA.
7. Underwriter’s Laboratory-U.L.
8. Other applicable State and Local Government Agencies Laws and Regulations.

B. All material and equipment shall be new and shall be delivered to the site in unbroken packages. All material and equipment shall be listed and labeled by Underwriters Laboratories or other recognized testing laboratories, where such listings are available. Comply with all installation requirements and restrictions pertaining to such listings.

C. Work and material shown on the drawings and in the specifications are new and included in the contract unless specifically indicated as existing or N.I.C. (not-in-contract).

D. Keep a copy of all applicable codes available at the job site at all times while performing work under this section. Nothing in plans or specifications shall be construed to permit work not conforming to the most stringent of codes.

E. Where a conflict or variation occurs between applicable Codes, the provisions of the most restrictive code shall be the requirement of the Contract Documents. Where a conflict or variation occurs between applicable Codes and the Contract Documents, the requirements of the most restrictive provision(s) shall be the requirement of the Contract Document.

1.7 SUBMITTALS

A. General:

1. Review of CONTRACTOR'S submittals is for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. CONTRACTOR is responsible for quantities; dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of work with that of all other trades and satisfactory performance of their work.

2. The CONTRACTOR shall review each submittal in detail for compliance with the requirements of the contract documents prior to submittal. The CONTRACTOR shall "Ink Stamp" and sign each item of the submittal with a statement "CERTIFYING THE SUBMITTAL HAS BEEN REVIEWED BY THE CONTRACTOR AND COMPLIES WITH ALL THE REQUIREMENTS OF THE CONTRACT DOCUMENTS". The CONTRACTOR shall clearly and specifically identify each individual proposed substitution or proposed deviation from the requirements of the contract documents with a statement "THIS ITEM IS A SUBSTITUTION".

3. Departure from the submittal procedure will result in re-submittals and delays. Failure of the CONTRACTOR to comply with the submittal requirements shall render void any acceptance or any approval of the proposed variation. The CONTRACTOR shall then be required to provide the equipment or method without variation from the contract documents and without additional cost to the contract.

4. The CONTRACTOR at no additional cost or delays to the contract shall replace any work, material and correct any deficiencies resulting from deviations from the requirements of the contract documents not approved in advance to commencement of work by the OWNER.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Submit comprehensive material list, shop drawings and complete technical data for the following equipment and materials:

1. General requirements:

   a. Meter pedestals

   b. Pull boxes

   c. Lighting standards

   d. All lighting lumenaires.

   e. Contactors

2. Special submissions:

   a. Submit computerization plans indicating foot-candle levels for parking areas should “Equals” be requested. Foot-candle level calculations shall be included with fixture shop drawing submittals.

B. Materials List and Shop Drawings:

1. Submit material list and equipment manufacturers for review within 35 days of award of contract. Give name of manufacturer and where applicable, brand name, type and/or catalog number of each item. Listing of more than one manufacturer for any one item of equipment, or listing items "as specified", without both make and model or type designation, is not acceptable. Shop drawings shall not be submitted before review completion of manufacturers list. The right is reserved to require submission of samples of any material whether or not particularly mentioned herein.

2. After completion of review of the material and equipment manufacturers list, submit shop drawings for review. Shop drawings shall be submitted in completed bound groups of materials (i.e., all lighting fixtures or all switchgear, etc.). The CONTRACTOR shall verify dimensions of equipment and be satisfied as to fit and that they comply with all code requirements relating to clear working space about electrical equipment prior to submitting shop drawings for review. Submittals which are intended to be reviewed as substitution or departure from the contract documents must be specifically noted as such or the requirements of the contract documents will prevail regardless of the acceptance of the submittal.

3. Shop drawings shall include catalog data sheets, instruction manuals, dimensioned plans, elevations, details, wiring diagrams and descriptive literature of components parts where applicable. Structural calculations and mounting details, signed by a Structural ENGINEER registered by the State of California, shall be submitted for all equipment weighing over four hundred pounds, and shall be in compliance with Title 21 of the California Code of Regulations.

4. Each shop drawing item shall be identified with the specification section and paragraph numbers, lighting fixture types and drawing sheet numbers, the specific shop drawing is intended to represent. Shop drawings 11" x 17" or smaller in size shall be bound in 3-ring binders. Divider tabs shall be provided in the 3-ring binders identifying and separating each separate shop drawing submittal item. Shop drawings larger than 11" x 17", shop drawing pages/sheets submittals shall be sequentially numbered with unique alphanumeric numbering system to facilitate correspondence referencing identification of individual sheets.

5. Shop drawings shall include the manufacturer's projected days for shipment from the factory of completed equipment, after the equipment is released for production by the CONTRACTOR. It shall be the responsibility of the CONTRACTOR to insure that all material and equipment is ordered in time to provide an orderly progression of the work. The CONTRACTOR shall notify the ARCHITECT of any changes in delivery which would affect the project completion date.

C. The CONTRACTOR shall be responsible for incidental, direct and indirect costs resulting from the substitution of specified contract materials or work.

D. The CONTRACTOR shall pay, upon request by the ENGINEER, $100.00 per hour for the ENGINEER's time involved in the review of substitution submittals and design changes resulting from the CONTRACTOR'S requested substitutions.

E. Maintenance and Operating Manuals

1. The CONTRACTOR shall furnish three copies of typewritten maintenance and operating manuals for all electrical equipment, fire alarm equipment, sound system equipment, etc., to the OWNER.

2. Instruct OWNER'S personnel in correct operation of all equipment at completion of project. Provide a minimum of one (1) two (2) hour duration separate instruction classes for each individual equipment group furnished as part of the contract. Instruction classes shall be presented by Manufacturer's authorized field service ENGINEER at the project site.

3. Maintenance and operating manuals shall be bound in three-ring, hard-cover, plastic binders with table of contents. Manuals shall be delivered to the OWNER with letter of transmittal, carbon copy to the ENGINEER.

F. Portable or Detachable Parts: The CONTRACTOR shall retain in his possession, and shall be responsible for all portable and detachable parts or portions of the installation such as fuses, keys, locks, adapters, locking clips, and inserts until final completion of contract work. These parts shall then be delivered to the OWNER or Engineer and an itemized receipt obtained, with copies of receipt sent to the ENGINEER.

G. Record Drawings

1. Provide and maintain in good order a complete set of electrical contract "record" prints. Changes to the contract to be clearly recorded on this set of prints. At the end of the project, transfer all changes to one set of transparencies to be delivered unfolded to the ENGINEER.

2. The actual location and elevation of all buried lines, boxes, monuments, vaults, stub-outs and other provisions for future connections shall be referenced to the building lines or other clearly established base lines and to approved bench marks. If any necessary dimensions are omitted from the record drawings, the CONTRACTOR shall, at his own expense, do all excavation required to expose the buried work and to establish the correct locations.

3. The CONTRACTOR shall keep the "record" prints up to date and current with all work performed.

PART 3 - EXECUTION

3.1 CLEANING EQUIPMENT, MATERIALS, PREMISES

A. All parts of the equipment shall be thoroughly cleaned of dirt, rust, cement, plaster, etc., and all cracks and corners scraped out clean. Surfaces to be painted shall be carefully cleaned of grease and oil spots and left smooth, clean and in proper condition to receive paint finish.

3.2 JOB CONDITIONS – PROTECTION

A. Protect all work, materials and equipment from damage from any cause whatever and provide adequate and proper storage facilities during the progress of the work. Provide for the safety and good condition of all the work until final acceptance of the work by the OWNER and replace all damaged or defective work, materials and equipment before requesting final acceptance.

3.3 EXCAVATION, CUTTING, BACKFILL AND PATCHING ADDITIONAL REQUIREMENTS

A. General:

1. Perform excavation, cutting, backfill and patching of the construction work required for the proper installation of the electrical work.

2. Patching shall be of the same material, thickness, workmanship and finish as existing and accurately match surrounding work to the satisfaction of the ENGINEER.

B. Excavation Temporary cover

1. Excavations for contract work occurring in streets, vehicular drive areas, parking lots, sidewalks or any paved surface; provide temporary steel plating and shoring support for the plates, to completely cover the excavations under one or more of the following conditions:

a. Excavation shall not remain "open" for more than four (4) calendar days; provide temporary plating.

b. Excavation shall not be "open" over weekends (Saturday, Sunday) or Holidays, provide temporary plating.

2. The temporary steel plating shall be a minimum of 0.75-inch thickness, but in no case shall the thickness be less than required to support AASHO-H20 traffic loading.

3. Provide a minimum of two (2) 100% open lane(s) (10 ft. width) for vehicular traffic at all times during construction, for vehicle access to all areas.

3.4 IDENTIFICATION

A. Equipment Nameplates

1. Panelboards, terminal cabinets, circuit breakers, disconnect switches, relays, time switches, contactors, pushbutton control stations, and other apparatus used for the operation or control of feeders, circuits, appliances, or equipment shall be properly identified by means of descriptive nameplates or tags permanently attached to the apparatus and wiring.

2. Nameplates shall be engraved laminated phenolic. Shop drawings with dimensions and format shall be submitted to the ENGINEER before installation. Attachment to equipment shall be with escutcheon pins, rivets, self-tapping screws or machine screws. Self-adhering or adhesive backed nameplates shall not be used.

3. Provide black-on-white laminated plastic nameplates engraved in minimum 1/4" high letters to correspond with the designations on the drawings. Provide other or additional information on nameplates where indicated.

B. Wire and Cable Identification

1. Provide identification on individual wire and cable including sign systems, electrical power systems (each individual phase, neutral and ground), empty conduit pull ropes, and control circuit.

2. Identification shall be provided at each termination location, splice location, pullbox, junction box and equipment enclosure.

a. Individual wire and cable larger than #6 AWG or 0.25 inch diameter, shall be provided with polypropylene identification tag holders, with yellow polypropylene tags interchangeable black alpha/numeric characters. Character height 0.25 inch as manufactured by Almetek Industries “EZTAG” series. Attach identification tags with plastic “tie” wraps, minimum of two for each tag.

b. Individual wire and cable #6 AWG and smaller or smaller than 0.25 inch diameter, shall be provided with water and oil resistant, flexible, pressure sensitive machine embossed plastic tags that wrap a minimum of 360 degrees around the wire/cable diameter. The entire tag shall then be covered with a clear flexible waterproof plastic cover wrapped a minimum of 540 degrees around the wire/cable diameter and completely covering the identification.

c. Each identification tag location shall indicate the following information: circuit number, circuit phase, source termination and destination termination equipment name (or outlet number as applicable).

3. Install identification after installation/pulling of wire/cable is complete, to prevent loss or damage to the identification.

C. Cardholders and cards shall be provided for circuit identification in panelboards. Cardholders shall consist of a metal frame retaining a clear plastic cover permanently attached to the inside of panel door. List of circuits shall be typewritten on card. Circuit description shall include name or number of circuit, area, and connected load.

D. Junction and pull boxes shall have covers stenciled with box number when shown on the drawings, or circuit numbers according to panel schedule. Data shall be lettered in a conspicuous manner with a color contrasting to finish.

3.5 TESTING

A. The CONTRACTOR shall obtain an independent testing laboratory that will provide all instrumentation and tests on the electrical system and equipment as hereinafter described and further directed by the ARCHITECT. The test shall be performed after the completion of all electrical systems included in the Contract Scope of Work. All tests shall be recorded and documented and submitted to the ENGINEER for review.

1. Test for Phase to Ground and Neutral Condition:

   a. Open main service disconnect.

   b. Isolate the system neutral from ground by removing the neutral disconnect link located in the service switchboard.

   c. Close all submain disconnects.

   d. Close all branch feeder circuit breakers.

   e. Turn all switches to “on” position, unplug all portable equipment from outlet receptacles.

   f. Measure the resistance of each phase to ground and phase to neutral. A properly calibrated "megger" type test instrument shall be used. The test voltage shall be nominal 500 volts.

   g. Record all readings after one minute duration and document into a complete report.

2. Isolating Grounds: In the event that low resistance ground neutral connections are found in the system, they shall be isolated and located by testing each circuit individually as outlined above. Make proper corrections to restore the resistance values to an acceptable value.

B. Method of obtaining ground resistance shall be in accordance with the latest edition of the James G. Biddle (Plymouth Meeting, Pennsylvania) manual published on this subject.

1. Perform "fall-of-potential" tests on the main grounding electrode of system per IEEE Standard No. 81, Section 8.2.1.5. When suitable locations for test rods are not available, a low resistance dead earth or reference ground shall be utilized.

2. Perform the two-point method test per IEEE Standard No. 81, Section 8.2.1.1, to determine the ground resistance between the main grounding system and all major electrical equipment frames, system neutral, and/or derived neutral points.

C. All equipment and personnel required for testing shall be furnished by the CONTRACTOR.

D. The Contractor shall complete the following work before any electrical equipment is energized:

1. All equipment shall be permanently anchored.

2. All bus connections shall be tightened per manufacturer's instructions and witnessed by the Engineer.

3. All ground connections shall be completed and identified. Perform and successfully complete all required megger and ground resistance tests.

4. All feeders shall be connected and identified.

5. The interiors of all electrical enclosures including busbars and wiring terminals shall be cleaned of all loose material and debris, paint, plaster, cleaners or other abrasive's overspray removed and equipment vacuumed clean. The Engineer shall observe all interiors before covers are installed.

6. All dry wall work and painting shall be completed within areas containing electrical equipment prior to installation of equipment.

7. All doors to electrical equipment rooms shall be provided with locks in order to restrict access to energized equipment.

8. Electrical rooms shall not be used as storage rooms after power is energized.

3.6 POWER OUTAGES

A. All electrical services in all occupied facilities of the contract work are to remain operational during the entire contract period. Any interruption of the electrical services for the performance of this work shall be at the convenience of the OWNER and performed only after consultation with the OWNER. Work involving circuit outages shall be only at such a time and of such a duration as approved in writing. Work involving circuit outages for the work required to connect new equipment and disconnect existing equipment shall be performed at the convenience of the OWNER.

B. Provide overtime work; double shift work; night time work; Saturday, Sunday, and holiday work to meet outages schedule.

C. Provide temporary electrical power to meet the requirements of this Article.

D. Any added costs to CONTRACTOR due to necessity of complying with this Article shall be included in the Contract Scope of Work.

E. When electrical work involving power disruptions to existing areas is initiated, the work shall proceed on a continuous basis without stopping until electric power is restored to the affected areas.

F. The CONTRACTOR shall request in writing to the OWNER a minimum of three weeks in advance, for any proposed electrical outage.

3.7 TEMPORARY ELECTRICAL POWER

A. Provide temporary electrical power if work requiring power outages cannot be completed in time permitted and approved by the OWNER.

B. Temporary electrical power shall be a standby diesel engine generators. Voltage, frequency, regulation, etc. shall be equal to that of normal utility source. Exhaust system shall have a critical silencing muffler. Generator voltage shall match the existing secondary voltage required at the site. The CONTRACTOR shall furnish all necessary cables, switches, etc. to make all required connections to existing panels, feeders, etc. Generator shall be sized to adequately carry the demand load. If record of demand load is not available, size generator to match corresponding transformer capacities and as directed by the ENGINEER.

C. After completion of required usage of the temporary generators, prior to completion of the project, the CONTRACTOR shall remove the generators. All temporary cables, switches, etc. shall be removed and all permanent equipment left in satisfactory condition.

D. Each generator shall be housed in security type sound attenuated housing to prevent access by unauthorized personnel. Temporary power cables, connections, etc. shall be protected from unauthorized personnel.

E. The CONTRACTOR shall be responsible for complete operation of the generator including personnel, fuel supplies, proper safety precautions, etc. Generator shall not be left unattended while in operation.

F. The CONTRACTOR shall provide temporary construction lighting and power as required in areas where work is being performed. Temporary power arrangements, outages, installation, work schedules, etc., shall be submitted in writing three weeks prior to requested outage date, and approved by the OWNER prior to start of work.

3.8 ASBESTOS, POLYCHLORINATED BIPHENYL (PCB) OR HAZARDOUS WASTE

A. It is understood and agreed that this contract does not contemplate the handling of asbestos, PCB or any hazardous waste material. If asbestos, PCB or any hazardous waste material is encountered, notify the OWNER immediately. Do not disturb, handle or attempt to remove.

3.9 SERIES RATED EQUIPMENT

A. Circuit protective Devices identified as "Series Rated" or "Current Liming" (i.e. CLCB - current limiting circuit breaker; CLF - current limiting fuse, etc.) shall be series rated and tested (UL 489 & CSA5) by the manufacturer with all equipment and circuit protective devices installed down stream of the identified series rated or current limiting device. Provide nameplates on all equipment located down stream, including the CLCB and CLF devices, to comply with N.E.C. paragraphs 110-22 and 240-83 "CAUTION SERIES RATED SYSTEM - NEW DEVICE INSTALLATIONS AND REPLACEMENTS SHALL BE THE SAME MANUFACTURER AND MODELS".

3.10 INDEPENDENT TESTING LABORATORY

A. The Testing Laboratory shall meet Federal OSHA criteria for accreditation of Testing Laboratories Title 29 Part 1907. Membership in the National Electrical Testing Association shall constitute proof of meeting said criteria.

3.11 SPARE FUSES

A. Provide three (3) spare fuses to match the installed fuses where the fuses are provided as part of the Contract. Provide spare fuse holders on inside door of each respective fuse compartment. Provide engraved nameplate on front of fuse access door indicating fuse type/catalog number ampere rating and manufacturer of fuse.

3.12 EQUIPMENT SEISMIC REQUIREMENTS

A. Equipment supports and anchorage’s provided as part of the contract shall be designed, constructed and installed in accordance with the earthquake regulations of the California Code, Title 24, Section 2312, and the Uniform Building Code (UBC).

B. Provide equipment anchorage details, coordinated with the equipment mounting provision, prepared, signed and "stamped" with PE registration by a civil or structural engineer licensed as a Professional Engineer (PE) in the State of California.

C. Mounting recommendations shall be provided by the manufacturer based upon approved shake table tests used to verify the seismic design of that type of equipment.

D. The equipment manufacturer shall certify that the equipment can withstand, and function following the seismic event, including both vertical and lateral required response spectra as specified in California Title 24 and the UBC. Alternatively, the manufacturer's certification may be based on an approved detailed structural analysis of the assembly, as specified in California Title 24 and the UBC.

E. The equipment manufacturer shall document the details necessary for proper seismic mounting, anchorage, and bracing of the equipment for back installation location.

F. Seismic qualification shall be considered achieved when the capability of the provided equipment, as described by the test response spectra, meets or exceeds the required response spectra as specified in California Title 24 and the UBC, for all equipment natural frequencies up to 35 HZ.

G. The seismic requirements are typical for each equipment item exceeding 100 pounds, including but not limited to the following:

1. Switchgear.
2. Equipment racks.
3. Panels.
4. Conduits with ceiling or wall support suspension attachments.
5. Lighting equipment.

3.13 ELECTRICAL WORK CLOSEOUT

A. Prepare the following items and submit to the ARCHITECT before final acceptance.

1. Two copies of all test results as required under this section.
2. Two copies of local and/or state code enforcing authorities final inspection certificates.
3. Copies of record drawings as required under the General Conditions, pertinent Division One Sections and Electrical General Provisions.
4. Two copies of all receipts transferring portable or detachable parts to the OWNER when requested.
5. Notify the ENGINEER in writing when installation is complete and that a final inspection of this work can be performed. In the event any defect or deficiencies are found during this final inspection they shall be corrected to the satisfaction of the ENGINEER before final acceptance can be issued.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. No separate measurement shall be made for the work in this Section.

4.2 PAYMENT

A. No separate payment shall be made for the work in this Section.

END OF SECTION